

REMARKS

Claims 1-20 were pending in this application. Claims 19-20 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claims 1 and 6 have been amended and claim 5 has been canceled. The specification has been amended at pages 18 and 21 to correct a reference numeral and typographical error, respectively. Care has been exercised to avoid the introduction of new matter. Indeed, adequate descriptive support for the present Amendment should be apparent throughout the originally filed disclosure and claims. Applicants submit that the present Amendment does not generate any new matter issue.

Claims 1, 4, 7-9 and 14-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Babich (U.S. Pat. No. 5,830,332) in view of Kataoka (U.S. Pat. No. 4,518,675). Applicants respectfully traverse the rejection for the reasons set forth *infra*.

Claims 2-3 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Babich (U.S. Pat. No. 5,830,332) in view of Kataoka (U.S. Pat. No. 4,518,675) and further in view of Howard (U.S. Pat. No. 5,436,047). Applicants respectfully traverse the rejection for the reasons set forth *infra*.

Claims 5-6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Babich (U.S. Pat. No. 5,830,332) in view of Kataoka (U.S. Pat. No. 4,518,675) and further in view of Chou (U.S. Pat. No. 5,772,905). Applicants respectfully traverse the rejection for the reasons set forth *infra*.

Claims 2, 3, 5, 6, 10 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Babich (U.S. Pat. No. 5,830,332) in view of Kataoka (U.S. Pat. No. 4,518,675) and further in view of Applicants' Admitted Prior Art ("AAPA"). Applicants respectfully traverse the rejection for the reasons set forth *infra*.

Claims 16 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Babich (U.S. Pat. No. 5,830,332) in view of Kataoka (U.S. Pat. No. 4,518,675) and further in view of Applicants' Admitted Prior Art ("AAPA"). Applicants respectfully traverse the rejection for the reasons set forth *infra*.

Independent claim 1, as amended, describes a method for patterning a carbon-containing substrate utilizing a patterned layer of a carbon-containing resist material as a mask and then safely removing the mask from the substrate without adversely affecting the substrate which comprises a plurality of thin film layers. The method comprises the sequential steps of: (a) providing a substrate including a surface comprising carbon, the substrate comprising a plurality of thin film layers; (b) forming a thin metal layer on the substrate surface; (c) forming a layer of a carbon-containing resist material on the thin metal layer; (d) patterning the layer of resist material; (e) patterning the substrate utilizing the patterned layer of resist material as a pattern-defining mask; and (f) removing the mask utilizing the thin metal layer as a wet strippable layer or as a plasma etch/ash stop layer.

Independent claim 16 describes a method of manufacturing a patterned recording medium. The method comprises the sequential steps of: (a) providing a substrate in the form of a magnetic or magneto-optical (MO) recording medium, the medium comprising a stacked plurality of thin film layers including at least one magnetic recording layer and an uppermost, carbon-containing protective overcoat layer at the surface of the substrate, comprising at least one material selected from amorphous hydrogenated and/or nitrogenated carbon, ion-beam deposited (IBD) hydrogenated and/or nitrogenated carbon, plasma enhanced chemical vapor-deposited (PECVD) hydrogenated and/or nitrogenated carbon, and diamond-like carbon (DLC); (b) forming an about 10 to about 200 Å thick layer of a material selected from the group

consisting of Al, Cr, Zn, Cu, Ni, Ti, Co, Ge, Ge-Se, Al-Ti, Mg-Ag, Ca-Ag, and their oxides on the uppermost, carbon-containing protective overcoat layer; (c) forming a layer of a carbon-containing resist material on the thin metal layer; (d) forming a patterned plurality of recesses in the surface of the layer of resist material, the recesses extending at least partway through the thickness of the layer of resist material to define a corresponding plurality of portions of the substrate surface, wherein step (d) comprises subjecting the layer of resist material to at least one process selected from thermal imprint lithography, wet chemical etching, and dry etching by means of ion irradiation; (e) patterning the substrate utilizing the patterned layer of resist material as a pattern-defining mask for forming a servo pattern in the medium, wherein step (e) comprises selectively removing substrate material from portions of the substrate defined by the mask *or* selectively ion irradiating or implanting portions of the substrate surface defined by the mask to alter the magnetic properties thereof; and (f) removing the mask and the thin metal layer in a single step stripping process utilizing a wet chemical etchant for the thin metal layer which undercuts and lifts off the mask *or* removing the mask and the thin metal layer in a two-step process comprising first removing the mask by means of a plasma etching/ashing process utilizing the thin metal layer as an etch stop layer and then removing the thin metal layer by means of a wet chemical removal process.

Independent claims 1 and 16 each requires at least the following sequential steps: (a) providing a substrate including a surface comprising carbon, wherein the substrate comprising a plurality of thin film layers; (b) forming a thin metal layer on the substrate surface; and (c) forming a layer of a carbon-containing resist material on the thin metal layer. As admitted by the Examiner neither Babich nor Kataoka discloses or remotely suggests a providing a substrate comprising a plurality of thin film layers or forming a layer of a carbon-containing resist

material. The Examiner relied on Chou or AAPA in an attempt to remedy the deficiencies of the Babich/Kataoka combination. See pages 4-5 of the Office action. The Examiner asserted that it would have been obvious to one of ordinary skill in the art to use a thermoplastic material such as PMMA as the carbon-containing resist material in the method of Babich/Kataoka because "Chou teaches that this will produce high resolution patterns at a low cost." See page 4, numbered paragraph 9. Alternatively, the Examiner asserted that it would have been obvious to one of ordinary skill in the art to have the substrate comprise a plurality of thin film layers and to use a carbon containing resist because "applicants admitted prior art teaches that these process steps are all known in the art." Applicants respectfully submit that the Examiner has failed to discharge the initial burden of establishing a *prima facie* basis to deny patentability to the claimed invention under 35 U.S.C. § 103.

Applicants submit that the applied prior art is void of any teaching, suggestion or motivation to support the Examiner's conclusion of obviousness. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). "Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546, 48 USPQ2d 1321, 1329 (Fed. Cir. 1998). There must be a teaching or suggestion within the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the

field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 665, 57 USPQ2d 1161, 1167 (Fed. Cir. 2000); *ATD Corp.*, 159 F.3d at 546, 48 USPQ2d at 1329; *Heidelberger Druckmaschinen AG v. Hantscho Commercial Prods., Inc.*, 21 F.3d 1068, 1072, 30 USPQ2d 1377, 1379 (Fed. Cir. 1994) ("When the patented invention is made by combining known components to achieve a new system, the prior art must provide a suggestion or motivation to make such a combination."). Lastly, one having ordinary skill in the art does not have the benefit of hindsight of Applicants' invention. *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 227 USPQ 337 (Fed. Cir. 1985). As such, the motivation to modify the prior art must come from the prior art not Applicants' disclosure.

The Examiner merely concluded that it would have been obvious to one of ordinary skill in the art to have the substrate comprise a plurality of thin film layers and to use a carbon containing resist because "applicants admitted prior art teaches that these process steps are all known in the art." The Examiner has failed to proffer any factual findings as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify the method disclosed by Babich/Kataoka to arrive at the claimed invention based upon specific objective evidence. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); *Ecolchem Inc. v. Southern California Edison, Co.*, 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000). Applicants submit that there is no motivation to modify the method of Babich/Kataoka to include the sequential steps: (a) providing a substrate including a surface comprising carbon, wherein the substrate comprising a plurality of thin film layers; (b) forming a thin metal layer on the substrate surface; and (c) forming a layer of a carbon-containing resist material on the thin metal layer. The Examiner has merely identified

these additional process steps in the AAPA and attempted to force them into the combined method of Babich/Kataoka, which does not even recognize much less attempt to address the problems of removing a carbon-based resist material applied atop a carbon containing substrate which comprises a plurality of thin film layers.

The present invention addresses and solves the problems and difficulties of the AAPA, such as degradation of magnetic properties, due to coincident removal of the carbon-based protective overcoat layer attendant upon the use of oxygen plasma ashing techniques and methodologies for resist removal subsequent to pattern definition in magnetic thin film layers for forming patterned thin film magnetic or MO data storage media. The present invention, therefore, has been made with the aim of eliminating the above-described difficulties associated with oxygen plasma ashing and involves interposition of a thin metal layer between the carbon-containing surface of the substrate (workpiece) to be patterned and the polymer-based resist layer, wherein the process for removal of the resist mask subsequent to processing for patterning the media comprises *either* removing the resist mask and the thin metal layer in a single step stripping process utilizing a wet chemical etchant for the thin metal layer which undercuts and lifts off the mask *or* removing the mask and the thin metal layer in a two-step process comprising first removing the mask by means of a plasma etching/ashing process utilizing the thin metal layer as an etch stop layer and then removing the thin metal layer by means of a wet chemical removal process. According to either of these embodiments of the invention, the resist mask is rapidly, safely, and efficiently removed without incurring damage to or loss of portions of the carbon-containing protective overcoat layer and concomitant adverse effects on the magnetic properties of the underlying magnetic recording layer(s). See pages 10 and 17 of the present disclosure. None of the references applied by the Examiner addresses or solves the problems of

the prior art. Moreover, there is no factual basis in the prior art upon which to support a prima facie case of obviousness under 35 U.S.C. § 103. *In re Freed*, 425 F.2d 785, 165 USPQ 570 (CCPA 1970).

Chou is discussed at pages 4-5 of the present disclosure. Chou describes a technique which can be utilized for forming a pattern in a substrate surface, e.g., a discrete track pattern in the surface of a magnetic recording medium. The thermal imprint lithographic technique disclosed therein, when applied to the manufacture of patterned magnetic media, involves etching or ion milling a magnetic recording layer or laminate of layers on a suitable substrate, utilizing a resist mask formed by thermal imprint lithography rather than optical (photo) lithography. However, as discussed at pages 8-9 of the present disclosure, when thermoplastic polymeric resists are used, they experience significant changes in their chemical and/or physical properties upon subjection to ion irradiation, which changes typically include, *inter alia*, cross-linking of the polymeric material leading to difficulty in mask removal subsequent to patterning. The problem of mask removal subsequent to patterning is exacerbated when the mask layer is applied atop a thin film laminate including a magnetic recording layer and a carbon (C)-based protective overcoat layer.

The Examiner merely asserted that it would have been obvious to one of ordinary skill in the art to use a thermoplastic material such as PMMA as the carbon-containing resist material in the method of Babich/Kataoka because Chou teaches that this will produce high resolution patterns at a low cost. However, Babich and Kataoka do not even recognize much less attempt to address the problems of removing a carbon-based resist material applied atop a carbon containing substrate which comprises a thin film laminate, since neither references even contemplates a substrate having more than one thin film layer. The remaining reference to

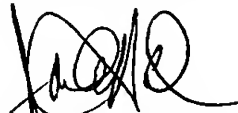
Howard fails to remedy the above deficiencies of Babich/Kataoka. Applicants therefore submit that the imposed rejections under 35 U.S.C. § 103 are not sustainable and should be withdrawn.

It is believed that all pending claims are now in condition for allowance. Applicants therefore respectfully request an early and favorable reconsideration and allowance of this application. If there are any outstanding issues which might be resolved by an interview or an Examiner's amendment, the Examiner is invited to call Applicants' representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'John A. Hankins', is written over a circular stamp.

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